PROTECTING PEOPLE AND ASSETS

Date: Tuesday, March 21, 2017

Timco Engineering, Inc.
849 N.W. State Road 45
P.O. Box 370
Newberry, FL 32669

SUBJECT: Internal Photographs / FCCID: BUVRANGERX5 / Model Number: Ranger-X5 /

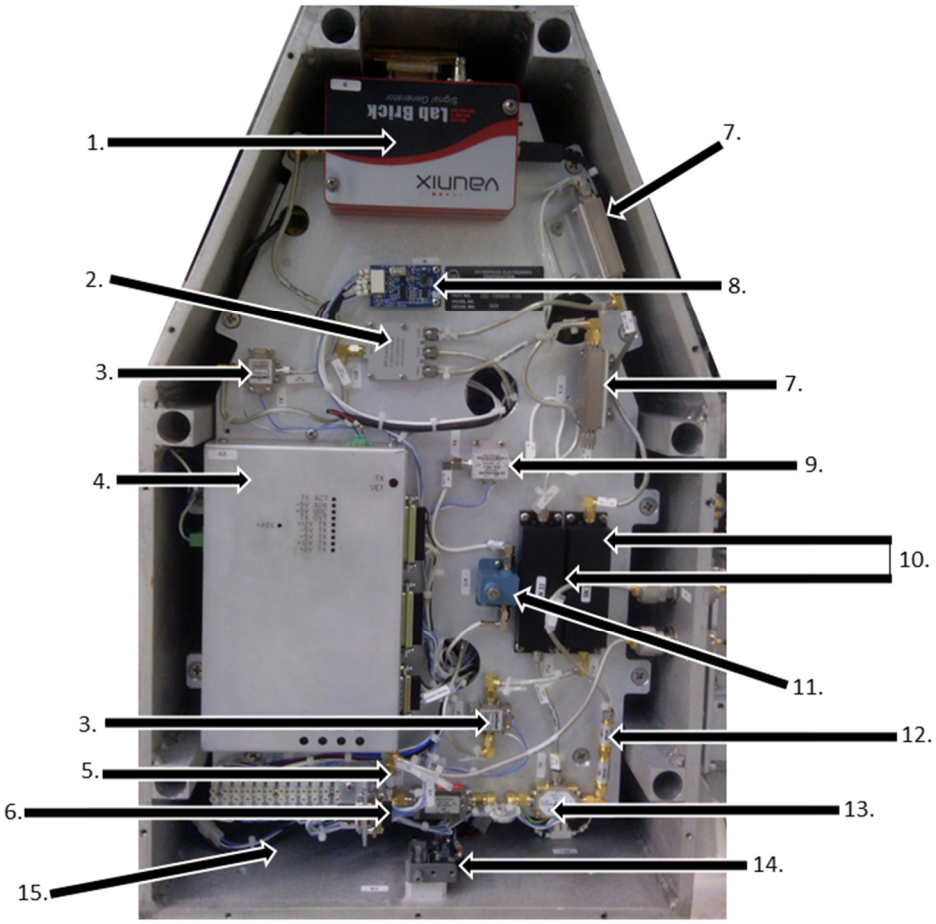
To Whom It May Concern:

Internal photographs of the **Ranger X5** system **RF** components used in the manufacturing of Ranger-X5 show various assembly pictures of the RF components as they are purchased from different manufacturers. **Enterprise Electronics Corporation** does not manufacture any of these RF components and are purchased as off-the-shelf from other manufacturers.

Regards,

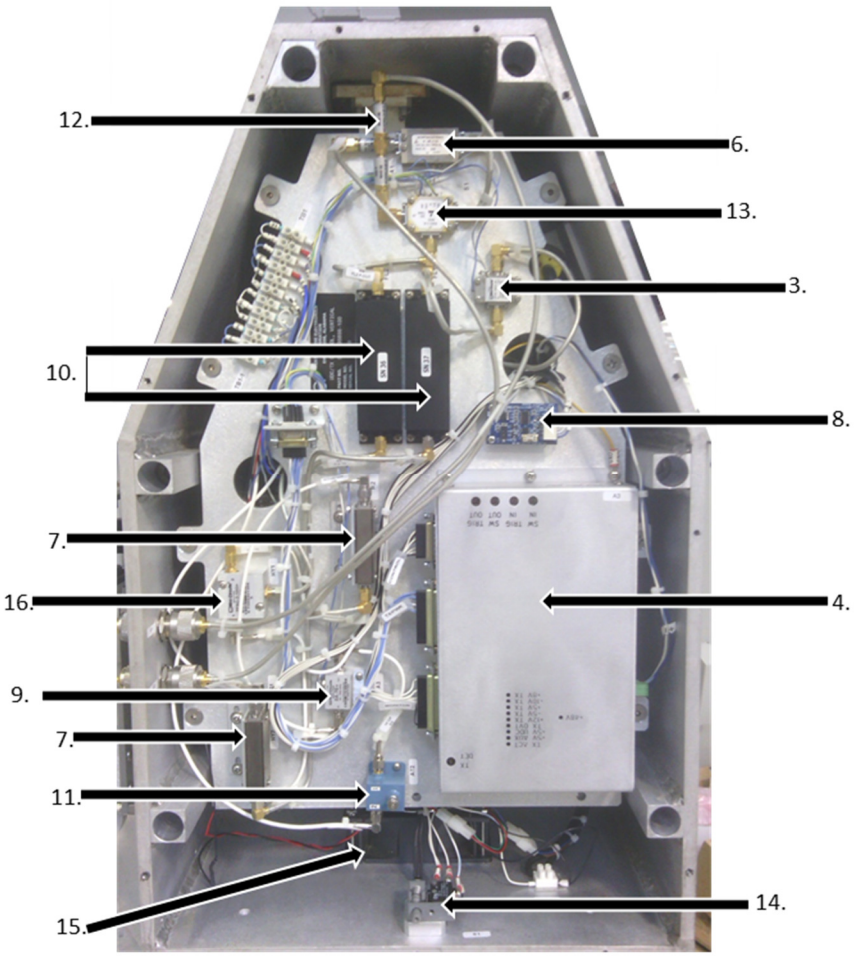
Richard A. Stedronsky
Strategic Business Development & Partnerships Director

Horizontal



1. Signal Generator, LMS-103
2. Power Divider, RFLT3WG18G
3. Coaxial RF Amplifier, ZVA-183X-S+
4. Transceiver Power Supply, 134728-100 **(NOT AN RF COMPONENT)**
5. PIN Diode Limiter, LP7012
6. X-Band LNA, CA910-259L
7. Image Reject Mixer, IRM0812LC2B-1
8. Temperature / Humidity Sensor, 134951-100 **(NOT AN RF COMPONENT)**
9. IF Amplifier, ZJL-7G
10. Narrow Bandwidth Cavity Filters, 3C60-9275/U10-0/0
11. Variable Attenuator, ARM-1
12. Coaxial Attenuator, BW-S40W2
13. Coaxial Switch, S2X1-1-5
14. Interlock Switch **(NOT AN RF COMPONENT)**
15. Cooling Fan **(NOT AN RF COMPONENT)**
16. 2-Way Splitter, ZFSC-2-10G

Vertical



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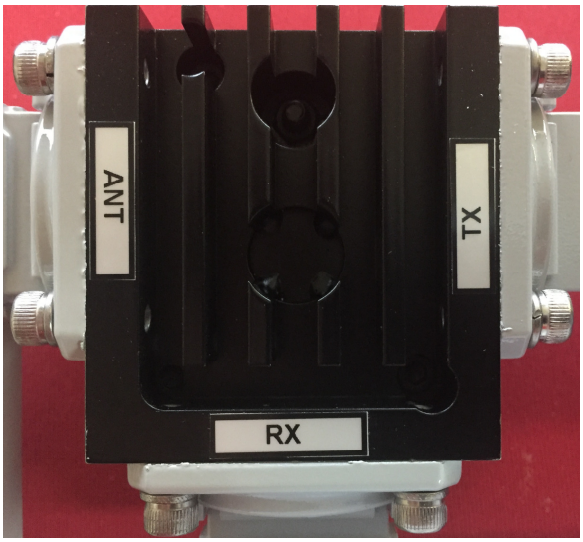
Crossguide Coupler (609870)

The Crossguide Coupler provides a point of connection for sampling the power of the transmit burst before it reaches the circulator.

3-Port Circulator (808815-1)



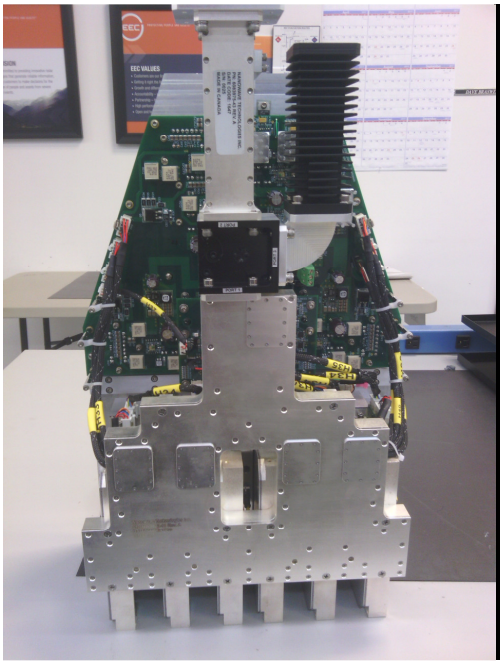
The function of the circulator is to provide isolation between the input of the circulator (TX) and the output of the circulator (RX). This isolation safeguards the receiver components from a mismatch occurring which may damage the ceramic output window. The TR Limiter on the RX port provides protection to the critical low power receiver components from the higher power of the transmit signal. The ANT port provides connection to the parabolic antenna.

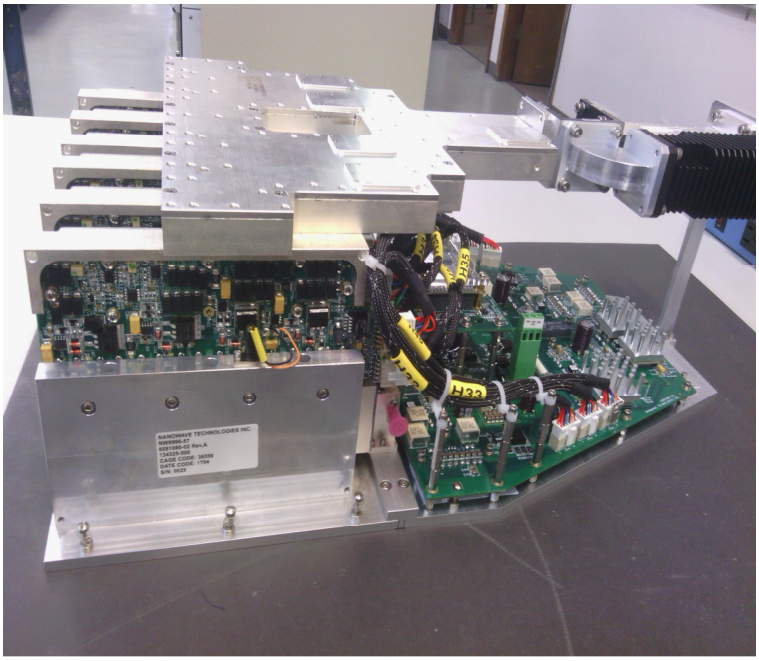
TR Limiter (NWLIM8896-57)

The TR Limiter protects the sensitive receiver components from the high-energy burst of the transmit RF burst. The TR Limiter is a passive device.

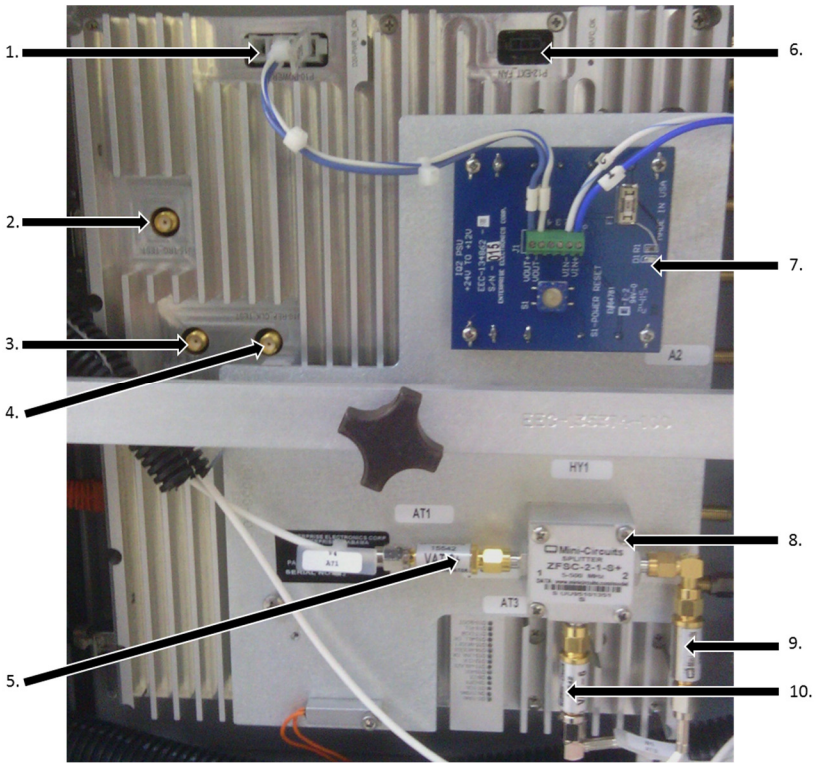
Pin Diode Limiter (LP7012)

This limiter is used as a protection device for the low noise amplifier (LNA). The diode limiter is used for the protection of the receiver from large input signals and it also allows the receiver to function normally when these large signals are not present.



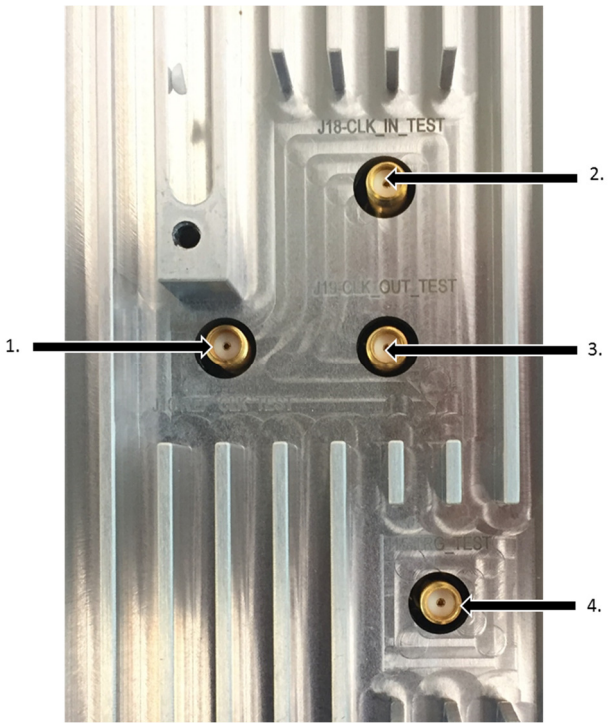


A 500-watt X-band solid-state provides higher duty cycles and greater sensitivity despite transmitting at significantly lower powers. The Ranger-X5 is capable of producing waveforms with duty cycles up to 15% and pulse widths up to 100-µsec utilizing pulse compression technology. The Transmitter Control Unit provides the control and trigger signals necessary for amplification within the Power Amplifier.

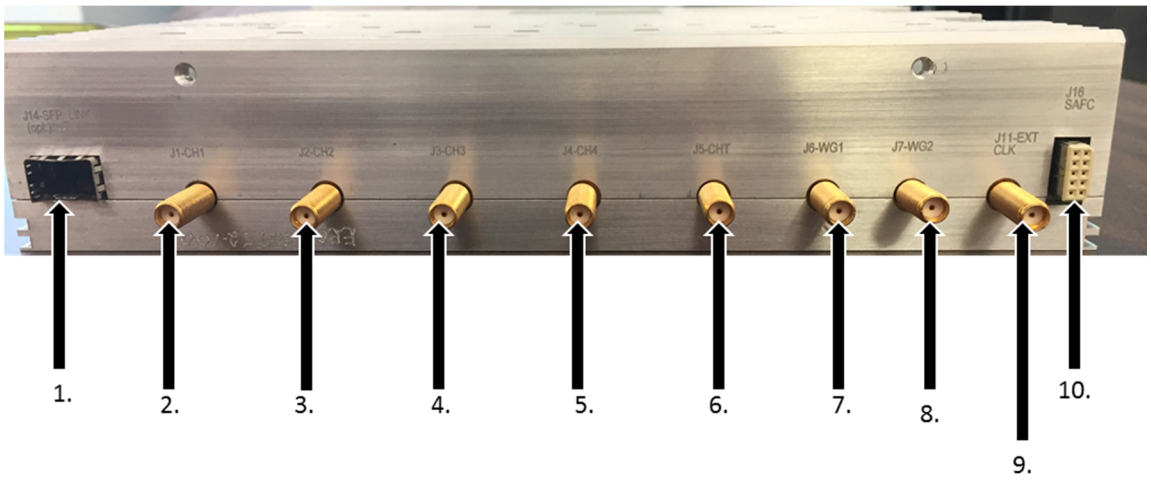


1. D20-PWR-IN
2. D15-TRG-TEST
3. J19-CLK-OUT-TEST
4. J10-REF-CLK-TEST
5. 10dB Attenuator, VAT-10 **(SUBJECT TO CHANGE, REFER TO TUNING PROCEDURES**)
6. D3-SAFC
7. IQ2-IFD-PCA **(NOT AN RF COMPONENT)**
8. 2-Way Splitter
9. 10dB Attenuator, VAT-10 **(SUBJECT TO CHANGE, REFER TO TUNING PROCEDURES**)
10. 5dB Attenuator, VAT-5 **(SUBJECT TO CHANGE, REFER TO TUNING PROCEDURES**)

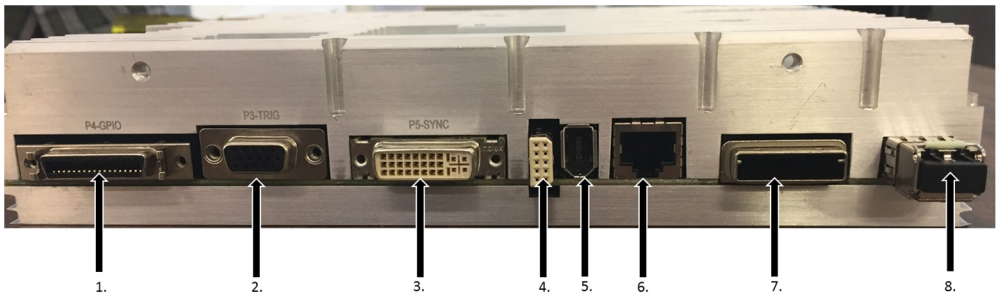
IQ2-IFD Status LEDs



1. J10-REF-CLK-TEST
2. J18-CLK-IN-TEST
3. J19-CLK-OUT-TEST
4. J15-TRG-TEST



1. J14-SFP-LINK (opt.)
2. J1-CH1
3. J2-CH2
4. J3-CH3
5. J4-CH4
6. J5-CHT
7. J6-WG1
8. J7-WG2
9. J11-EXT
10. J18-SAFC



1. P4-GPIO
2. P3-TRIG
3. P5-SYNC
4. J10-ANTENNA POSITION
5. J9-IRX
6. J8-ETHERNET
7. J17-PCIE
8. J13-FIBER OPTIC

The IQ2-IFD receives the horizontal and vertical receive IF from the Horizontal UDC and Vertical UDC. The IQ2-IFD digitizes the received IF and outputs “I and Q” serial data in digital format. The data output connects to the IQ2-DSP via a fiber-optic cable and the fiber-optic rotary joint.

The IQ2-IFD Assembly extracts the maximum amount of useable information from reflected radar energy. There are five 60 MHz IF channels sampled at >76 MHz. Four of the IQ2-IFD 60 MHz IF channels (two channels for the horizontally polarized signal and two channels for the vertically polarized signal in dual polarization systems) include wide-band downconverters to base-band for Receiver use. The fifth IF channel normally functions as a Transmitter sample (IF burst) channel for Transmitter amplitude and phase correction on a pulse-by-pulse basis.

This processing can include pulse compression as an option. The digital IF signals pass to the IQ2-DSP unit via a 2.5 Gbits/sec optical link and command/control/status information is through a Gigabit Ethernet link. The unit has nine fully programmable triggers, serial angle input ports, and other I/O ports that for special applications.